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New *Tychobythinus* (Coleoptera, Staphylinidae, Pselaphinae) from East and Southeast Asia

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Tychobythinus mica sp.n. from China, *T. formosanus* sp.n. from Taiwan, and *T. siamensis* sp.n. from Thailand are described. A key to the East and Southeast Asian *Tychobythinus* is given. The characters used to define the subtribes of Bythinini are discussed. *Machaeritina* JEANNEL and *Xenobythina* JEANNEL are placed in synonymy of Bythinini.

Key words: Coleoptera, Staphylinidae, Pselaphinae, *Tychobythinus*, taxonomy, East and South East Asia.

INTRODUCTION

JEANNEL (1950) recognized within the Bythinini the three subtribes Bythinina, *Machaeritina*, and *Xenobythina*. He based them on inconsistent characters that vary within each subtribe (the size of the frons, the presence and size of the tubercles on the maxillary palps, the shape of the second segment of maxillary palp, the presence of sexual characters on the antennomeres, the presence of a pair of distal denticles in the internal sac of the aedeagus) or on characters absent from some of the included taxa (enlarged 3rd antennomere). Most of the subsequent authors such as PARK (1953), BESUCHET (1974, 1982, 1985), KURBATOV (1989, 1994), and POGGI (1991) have not referred to these subtribes.

BESUCHET (1974) provided a key to the Bythinini occurring in the western portion of the Palaearctic realm and implicitly recognized two groups within the tribe. Members of one of them possess an elongate antennal scape, narrowed near base, lacking a dorsobasal ridge, and usually lack sexual characters on the scape and pedicel (*Bathybythus* BESUCHET, *Bythoxenus* MOTSCHULSKY, *Ceratobythus* NORMAND, *Decatocerus* SAULCY, *Leptobythus* JEANNEL, *Machaerites* MILLER, *Prionobythus* JEANNEL, *Spelaeobythus* LÖBL, and *Xenobythus* PEYERIMHOFF [i.e. most *Machaeritina* plus *Xenobythinina* of JEANNEL]). The subsequently described European *Antrobythus* BESUCHET and *Gasparobythus* POGGI, but also *Bythoxenites* JEANNEL from Japan, *Subterrochus* PARK and *Speleochus* PARK from the USA, possess these antennal characters.

The second group includes genera whose members have the scape usually with a distinct dorsobasal ridge delimiting a basal depression, and possess male sexual characters on scape or pedicel, or have a short, relatively robust scape. In addition to the Palaearctic *Bryaxis* KUGELANN, *Bythinus* LEACH, *Glyphobythus* RAFFRAY, *Linderia* SAULCY, and *Typhlobythus* JEANNEL (i. e. Bythinina of JEANNEL) listed in BESUCHET (1974), the Nearctic *Machaerodes* BRENDEN also exhibits these features.

The East and Southeast Asian Bythinini, described below, share characters with both "groups". Thus, they are interesting because of their morphological char-

acters and their distribution which extends the known range of the so far exclusively Holarctic Bythinini to Taiwan and Thailand.

MATERIAL

The examined specimens were extracted from sifted forest litter. They are preserved in the Muséum d'histoire naturelle, Geneva (MHNG), the Zoological Museum, Moscow (ZMUM), and the private collection of the junior author (CSKM).

RESULTS

Key to the East and Southeast Asian Tychobythinus

- 1 Pronotal punctation coarse, intervals between punctures much smaller than diameters of punctures 2
- Pronotal punctation fine, intervals between punctures much larger than diameters of punctures 3
- 2 Scape narrowed basally, without dorsobasal ridge *siamensis* sp.n.
- Scape not narrowed basally, with distinct dorsobasal ridge ... *formosanus* sp.n.
- 3 Larger species 1.05–1.20 mm long. Parameres of aedeagus each bearing one wide and one slender seta *aino* KURBATOV
- Smaller species 0.90–0.95 mm long. Parameres of aedeagus each bearing one wide and two slender setae *mica* sp.n.

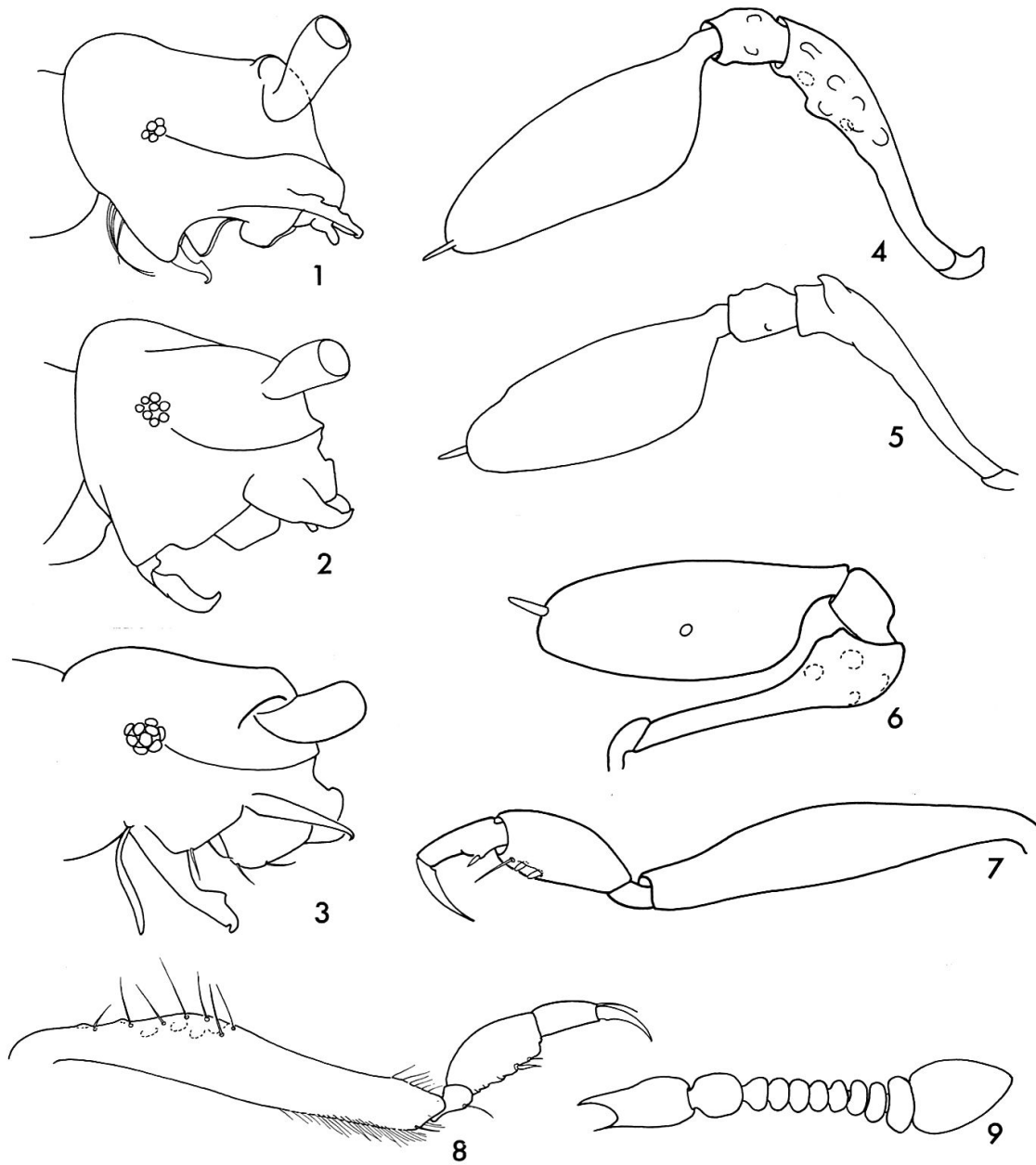
Tychobythinus siamensis sp.n.

Holotype male: Thailand, Chiang Mai prov., Doi Inthanon, 1780 m, ravin, forest litter, 17.XII.1986, leg. P. SCHWENDINGER (MHNG). Paratypes: 1 female, same data as holotype; 1 female, Doi Inthanon, 1720 m, leaf litter near creek, 7.XI.1985, leg. D. BURCKHARDT & I. LÖBL (MHNG).

Description. Length 1.2 mm. Reddish-brown, legs, antennae, and palpi paler. Pubescence recumbent.

Head 0.25–0.26 mm long, 0.26 mm wide. Punctation coarse, very dense, confluent, dorsal surface appearing granulate. Pubescence long, oriented toward median axis of head. Frons short, narrowed behind antennal tubercles, then gradually widened toward eye, with anterior edge rounded. Frontal depression shallow. Frontoclypeus strongly inclined, not projecting, with convex clypeal margin. Vertex raised, convex. Tentorial foveae at level of anterior eye margin, indistinctly delimited, smaller than interval between them. Eye small, with 3 facets in female, 5 or 6 facets in male. Maxillary palp lacking tubercles; 2nd segment 0.16 mm long, gradually thickened toward apex; 3rd suboval, 0.065 mm long and 0.04 mm wide; 4th stout, 0.18 mm long and 0.07 mm wide. Antenna fairly short (Fig. 9). Scape straight, about 2 times as long as wide, gradually widened toward apex, in dorsal view narrowed behind base, with dorsal ridge widely interrupted in middle. Antennomere 2 about as long as half of scape, slightly longer than wide; 3 small, slightly wider than long; 4–7 of same size, slightly shorter and wider than 3; 8 and 9 as long as and wider than 7, 9 twice as large as long; 10 slightly asymmetrical, almost 3 times as wide as long; 11 slightly longer than scape, about 1.5 times as long as wide, almost as long as 6 to 10 combined.

Pronotum 0.29–0.31 mm long, 0.34–0.35 mm wide. Punctation coarse and very dense, not confluent except near antebasal sulcus, consisting of deep, mostly



Figs 1–9. *Tychobythinus* sp.: Head, laterally, of *T. siamensis* (1), *T. formosanus* (2) and *T. mica* (3). Female maxillary palp of *T. formosanus* (4); Male maxillary palp of *T. formosanus* (5); Maxillary palp of *T. mica* (6); Male protibia with tarsus of *T. mica* (7) and *T. formosanus* (8); Antenna of *T. siamensis* (9).

well delimited punctures. Pubescence longer than that on head, oriented mesally, and that on median portion oriented apically. Antebasal sulcus very narrow. Lateral fovea situated in a large, smooth depression.

Elytra 0.51 mm long, both combined 0.58 mm wide. Punctuation coarse and dense, coarser than that on pronotum, consisting of gradually deepened punctures appearing much larger than intervals between them. Pubescence longer than that on pronotum. Humeral area rounded. Basal foveae about as large as interval between them. Marginal ridge visible in dorsal view, delimiting subhumeral fovea.

Metathoracic wings not examined.

Median portions of metasternum and 1st visible abdominal sternite much more coarsely punctate than remaining surface of metasternum and abdomen. Abdominal pubescence shorter than that of elytra.

Protibia and mesotibia straight, widest in middle portion or behind middle. Metatibia arcuate, gradually widened toward apical third, then narrowed.

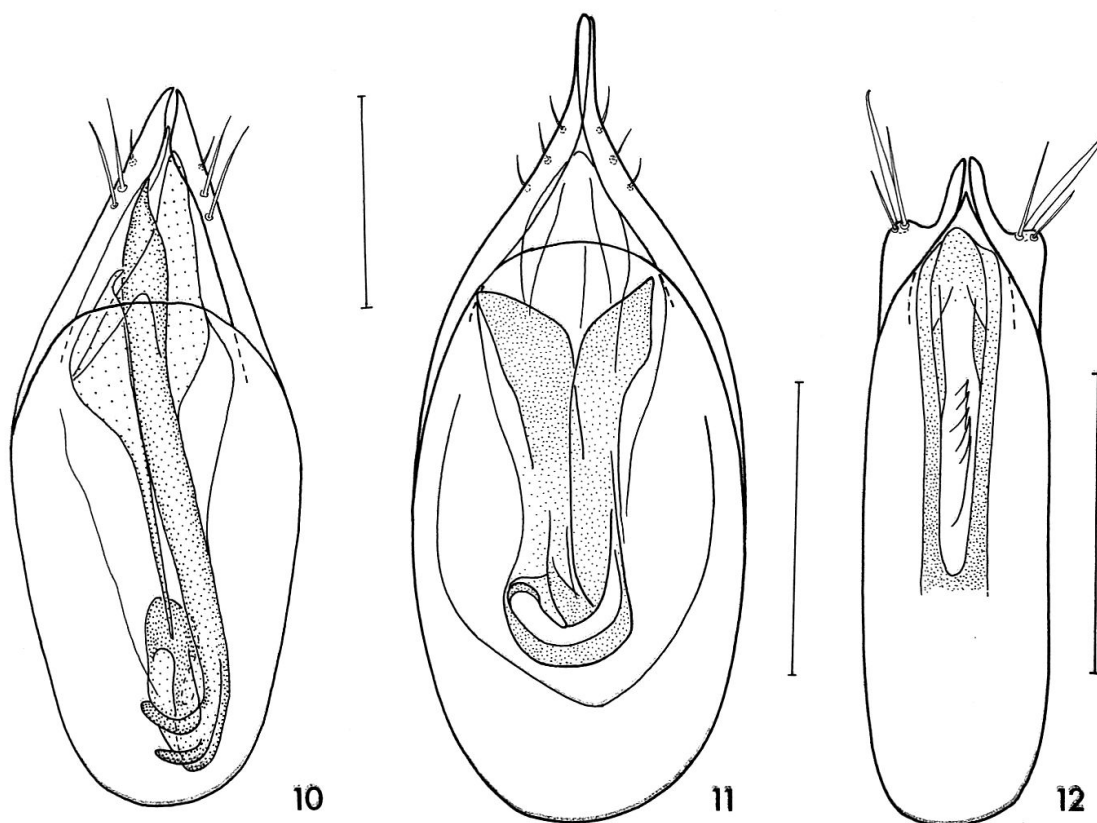
Male sexual characters. Absent from frons, antenna, and legs. Posterior portion of postgenae (Fig. 1) strongly inflexed toward neck, with median carina and a row of long, erect setae. Gular area transversally raised, bearing a central process oriented forward, two narrow trichomes and two small tubercles. Postmental area with median groove. Gular area delimited posteriorly by a transverse tridentate ridge. Aedeagus (Fig. 10) 0.34 mm long.

Tychobythinus formosanus sp.n.

Holotype male: Taiwan, Pingtung Hsien, Peitawushan, Kuai-ku hut, 2135 m, 30.IV.1992 (T 108), leg. A. Smetana (MHNG). Paratypes: 2 males, 2 females, same data as holotype (MHNG, 1 male CSKM).

Description. Length 1.15–1.20 mm. Body, legs, and antennae uniformly reddish-brown. Pubescence semi-erect.

Head 0.21–0.25 mm long, 0.26–0.28 mm wide. Punctuation coarse and very dense, similar to that in *T. siamensis*. Dorsal pubescence oriented mesally except



Figs 10–12. Aedeagi in *Tychobythinus*: *T. siamensis* (10), *T. formosanus* (11) and *T. mica* (12). Scale bars = 0.1 mm.

for frontal impression with setae oriented anteriorly, and for centre of vertex with setae oriented apically. Frons as in *T. siamensis*. Eye small, with 7–8 distinct facets. Vertex flattened, gradually raised apically, then abruptly inclined toward neck; pericervical area almost vertical. Occipital ridge reduced, present on neck only. Longitudinal gular ridge present in female only, situated on strongly inclined portion. Centre of tentorial foveae at level of eye centre. Genal area impressed, coarsely punctate. Clypeal ridge as in *T. siamensis*. Maxillary palp sexually dimorphic, somewhat longer than in *T. siamensis*: 2nd segment sinuate, about 0.17 mm long, 3rd small, 0.04 mm long, 1.2 times as long as wide; 4th stout, 0.20–0.22 mm long and 0.07–0.08 mm wide. Antennae fairly short. Scape cylindrical, not narrowed basally, slightly curved in lateral view, with dorsobasal ridge interrupted in middle. Following antennomeres slightly longer and wider than those in *T. siamensis*, with similar length/width ratio but 8–10 gradually longer, 8 about 1.4 times, 9 1.6 times and 10 1.8 times as long as wide; 11 about as long as 7–10 combined.

Pronotum 0.28–0.33 mm long, 0.34–0.38 mm wide. Similar to that in *T. siamensis* but with punctuation coarse and very dense, punctures separated by narrow ridges; pubescence distinctly longer than that on head and oriented posteriorly in median portion of disc. Antebasal sulcus very narrow. Lateral fovea situated in a large, smooth depression.

Elytra 0.42–0.43 mm long, combined 0.53–0.56 mm wide. Punctuation fine and dense, very shallow, punctures not well delimited, about as large as intervals. Pubescence about as long as that on pronotum. Humeral area rounded. Marginal ridge visible in dorsal view, touching subhumeral fovea from below.

Metathoracic wings absent in female, not examined in male.

Metasternum and first visible sternite with punctuation as in *T. siamensis*. Abdominal pubescence about as long as that on elytra.

Protibia sinuate. Mesotibia straight, with apical edge flattened. Metatibia curved, gradually thickened apically.

Male sexual characters. Absent from frons, vertex, and antennae. Postgenae flat, with lateral edge somewhat raised, and with large, transverse depression. Anterior edge of postgenae sharply delimited, posterior edge bearing a strong process oriented ventrally. Ventral surface of neck with a large, central tubercle, delimited by longitudinal striae. Maxillary palp (Fig. 5) without tubercles, segment 2 abruptly narrowed near apex, with minute subapical denticle arising from outer edge. Protibia flattened and widened, with several erect setae on outer edge (Fig. 8). Protarsus with widened 2nd segment. Aedeagus (Fig. 11) 0.27 mm long.

Female sexual characters. Eye slightly smaller. Segments 2 and 3 of maxillary palp tuberculate (Fig. 4).

Tychobythinus mica sp.n.

Holotype male: China, Sichuan prov., Wolong Nat. Res., 500 m, litter, 16.V.1994, leg. KURBATOV (ZMUM). Paratypes: 1 male, 4 females, same data as holotype (ZMUM, MHNG, CSKM).

Description. Length 0.90 – 0.95 mm. Body reddish-brown, legs and palpi slightly paler. Pubescence recumbent.

Head 0.20–0.21 mm long, 0.22–0.23 mm wide. Punctuation dense and coarse, particularly laterally, with almost confluent punctures. Pubescence on vertex fairly long, oriented apicomeresally. Frons, frontal impression, frontoclypeus, and vertex as in *T. siamensis*. Tentorial foveae as in *T. siamensis* or situated slightly behind level

of anterior eye margin. Eye with 8–9 facets in male, 7–8 facets in 2 females, and 15–17 facets in two other females. Maxillary palp (Fig. 6) with 2nd segment 0.12 mm long, abruptly thickened apically and bearing few ventro-apical tubercles; 3rd 0.03 mm long and 0.025 mm wide, 4th segment 0.14 mm long and 0.05 mm wide. Antenna short. Scape about 2 times as long as wide, not narrowed at base, with dorsobasal ridge entire but not very distinct. Pedicel spherical, as long as wide, as large as scape. Antennomere 3 slightly wider than long, about 1.3 times less wide than pedicel; 4–8 equally large, more transverse than 3, 7 and 8, slightly wider than 4 to 6, 9 about 2 times as wide as long, slightly wider than 8; 10 as long as 9 but wider, slightly asymmetrical, 11 longer than scape, as long as 6–10 combined, about 1.4 times as long as wide.

Pronotum 0.23–0.24 mm long, 0.27–0.29 mm wide. Discal punctation sparse and fine, with intervals about 2 times as large as punctures; punctation between ante-basal sulcus and base dense and coarse, almost confluent. Pubescence similarly oriented as but longer than that on head. Antebasal sulcus narrow, indistinctly delimited. Lateral fovea situated in a foveiform depression.

Elytra 0.33–0.36 mm long, combined 0.27–0.29 mm wide. Punctation coarse and dense, consisting of punctures about as large as intervals. Pubescence as long as that on pronotum. Humeral area rounded. Marginal ridge not visible in dorsal view, indistinctly reaching anterior margin of subhumeral fovea. Basal foveae smaller than interval between them.

Metathoracic wings present in female, not examined in male.

Metasternum with few distinct marginal punctures between metacoxae; median portion of 1st visible sternite with similar punctures, remaining surface of metasternum and sternite impunctate. Abdominal pubescence about as long as that on elytra.

Tibiae similar to those in *T. formosanus*.

Male sexual characters. Head with postgenae widened ventrolaterally and angulate, joined by a very thin ridge. Surface in front of latter strongly impressed, bearing 2 distinct lateral foveae. Lower portion of the gular constriction with two very long setae (Fig. 3). Protarsus (Fig. 7) with 2nd segment widened and with two short setae, 3rd bearing ventral setiferous tubercle. Aedeagus (Fig. 12) 0.22 mm long.

Comments. This species resembles *T. aino*, but it may be easily distinguished by the male sexual characters. The size of the eyes in *T. mica* is unusually variable.

DISCUSSION

Tychobythinus GANGLBAUER includes some 90 described species (NEWTON & CHANDLER, 1989; subsequent *Zool. Record*), most of which occur in the western portion of the Palaearctic realm, five are Nearctic (CHANDLER, 1990), and one is from the Kurile islands (KURBATOV, 1992). Thus, *Tychobythinus* is within the Bythinini the sole genus distributed in both, Old and New World. It is also one of the more speciose genera of the Bythinini and exhibits notable ecological diversity. Members may be found in swamps, at edges of streams, in forest litter, under stones, and in endogenous habitats including caves (pers. obs.). The Old World species have reduced metathoracic wings and, with the exception of *T. glabratus*, strongly restricted ranges.

The West Palaearctic members of *Tychobythinus* have the antennal scape elongate, subbasally narrowed, without a ridge delimiting a depressed basal area. The

aedeagi have apically narrowed and curved parameres and an internal sac bearing relatively simple, sclerotised structures. The gular region in male *Tychobythinus* is usually strongly modified and bears conspicuous ridges, processes, and setae. While other Bythinini which possess similar antennae and sexual characters are defined by additional, derived characters, *Tychobythinus* is characterized by the absence of such characters. Thus, *Tychobythinus* may be polyphyletic, as suggested by its considerable morphological and habitat diversity.

The only other speciose and ecologically diverse genus within the Bythinini is *Bryaxis* KUGELANN. Members of *Bryaxis* have the scape with a well developed, entire dorsobasal ridge, the secondary sexual characters usually situated on the scape or pedicel, and wide aedeagal parameres. The internal sac in *Bryaxis* exhibits a variety of structures, and the sexual modifications of the gular area in males are mostly inconspicuous.

The species described in the present paper, and *T. aino* KURBATOV from the Kurile islands, have the aedeagi with slender, curved parameres, as those in other members of *Tychobythinus*. They possess also a simple, elongate scape, simple pedicel, and complex gular characters in the male. In *T. formosanus* and *T. mica* (as in *T. aino*), the scape is not narrowed basally, and has a more or less distinct dorso-basal ridge. Thus, these species share the sexual characters with *Tychobythinus* and partly the scapal character with *Bryaxis*. *Tychobythinus siamensis* has a scape typical of *Tychobythinus*, but not the internal sac of the aedeagus. The members of the Nearctic *Pselaptricus* BRENDÉL (placed by JEANNEL, 1950 in his *Xenobythina*) have also an elongate, basally narrowed scape, but it bears a distinct dorsobasal ridge. Thus, *Pselaptricus* also appears intermediate between the BESUCHET's (1974) two main groups of Bythinini.

In the absence of a sound phylogeny of the Bythinini we prefer to assign the East and Southeast Asian Bythinini to *Tychobythinus*. While the characters used by JEANNEL (1950) to define his subtribes are not constant and probably without phylogenetic significance, those of BESUCHET (1974) appear fairly reliable when limited to the West Palaearctic taxa. As conclusion, the following new synonymies are proposed:

Machaeritina JEANNEL, 1950; type genus *Machaerites* MILLER, 1855 – syn. nov.
Xenobythina JEANNEL, 1950; type genus *Xenobythus* PEYERIMHOFF, 1901 – syn. nov.
 of Bythinini RAFFRAY, 1890.

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